"Hey Alexa–order groceries for me" – the effect of consumer–VAI emotional attachment on satisfaction and repurchase intention

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Abstract

Purpose – Given the growing prominence of voice-activated artificial intelligent devices (VAIs) as the strategic market-facing technology for grocery purchases, this article aims to bring together theories on anthropomorphism, trust, emotional attachment, self-connection and self-disclosure in one conceptual framework establishing that consumer–VAI relationship has significant implications for grocery purchase satisfaction and intention to repurchase using VAIs.

Design/methodology/approach – The study tested seven hypotheses through a survey-based approach comprising of two studies.

Findings – The study empirically supports VAI anthropomorphism and trust in VAIs as predictors of consumer–VAI emotional attachment and establishes the moderating role of consumer self-disclosure. Consumer–VAI self-connection resulting from emotional attachment results in grocery purchase satisfaction and intention to repurchase using VAIs.

Research limitations/implications – The article offers a novel perspective on consumer–VAI relationships and the use of VAIs for grocery purchases. It establishes an agentic role of consumers when ordering groceries using VAIs, creating a deeper understanding of how consumer–VAI emotional attachment results in extensions of consumers' self-identity, resulting in purchase satisfaction and repurchase intention using VAIs.

Practical implications – Establishing a consumer–VAI relationship, the article brings out the strategic importance of VAIs for marketers in grocery purchases and repurchases, which can be extended to other purchases.

Originality/value – The article offers a new perspective on establishing VAIs as strategically important market-facing devices by examining consumer relationships with VAIs and offering valuable insights on how consumer emotional attachment with VAIs results in satisfaction and intention to repurchase using VAIs.

Keywords Satisfaction, Trust, Anthropomorphism, Emotional attachment, Self-disclosure, Intention to repurchase, Self-connection

Paper type Research paper

1. Introduction

Jane and her family have been eating at home and trying different recipes. As Jane struggles with dinner ideas, she asks her voice-activated artificial intelligent device, Alexa, for an easy recipe that she can make quickly. Alexa asks her what she feels like eating, and based on Jane's

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disclosure, Alexa suggests some easy recipes using the Campbell's soup Jane bought last week. As Jane carries on with her cooking, Alexa reminds Jane that she has Dunkin Donuts coupons, which she can use for her next coffee purchase, and reminds her that it is time for her weekly grocery shopping. To that, Jane nods and says, "Hey Alexa, order groceries for me."

Does this scenario sound unrealistic? In fact, this is the new consumption reality. Voice-activated artificial intelligence assistants (VAIs) such as Alexa, Siri and Google are becoming a part of consumers' households and their daily lives (Moriuchi, 2019). More than 55% of households in the USA are likely to have a VAI by 2022, with a reported eight billion VAIs in use by 2023 (Morar, 2019). VAIs are becoming an essential part of people's everyday lives (Oakes, 2020) and creating an additional touchpoint between firms and consumers (Sciuto *et al.*, 2018), providing a novel path for purchases such as groceries (Simms, 2019).

Acknowledging the increasing popularity of VAIs, grocery retailers are devising marketing strategies to become part of this consumer–VAI relationship, and more importantly, consumers' grocery purchases and repurchases through VAIs. Retailers such as Walmart and Carrefour are now providing grocery services in France through Google's VAIs to compete with Alexa's grocery services (Schulze, 2019; Sword, 2020). In the UK, grocery retailers Ocado and Morrison have partnered with Amazon's Alexa, taking advantage of Alexa's voice assistance for ordering and repurchasing groceries (Thakker, 2019). These strategic partnerships between grocery retailers and VAIs indicate how VAIs are transforming firm–consumer relationships by becoming channels for consumers to get product information and purchase and repurchase products and groceries (Dawar and Bendle, 2018; Simms, 2019).

Imbued with human-like characteristics such as voice and responsiveness, VAI plays the role of a partner in a relationship who listens to consumers' disclosed needs and fulfils those needs, such as suggesting recipes, adding items to grocery lists or ordering groceries (Simms, 2019). Using consumers' self-disclosure or the "verbal communication of personally relevant information" (Laurenceau *et al.*, 1998, p. 1239), VAIs offer consumers personalized recommendations and the convenience of ordering and reordering (Dawar and Bendle, 2018). Providing personalized suggestions, recommendations and assisting with daily activities can enhance consumers trust in these anthropomorphized VAIs and create feelings of connection, love and affection, similar to their "affectionate ties" with other objects (Vlachos and Vrechopoulos, 2012, p. 1480). As consumers are staying home and shopping online, VAIs have become an essential part of more than one-third of US households (Kinsella, 2020). Consumers today are communicating with VAIs for everyday purposes, such as getting cooking ideas, performing touch-free interactions and even getting their symptoms analyzed by an expert (Kinsella, 2020).

As consumers are increasing their trust in their VAIs and indulging in self-disclosure, Dawar and Bendle (2018) projected that VAI users will shift their "allegiances from trusted brands to the trusted A.I. assistant" (p. 5). By inculcating human traits or actions and building trust in the relationship, which was the building blocks for creating an emotional attachment between consumers and brands or retailers (Hazan and Shaver, 1994; Thomson *et al.*, 2005; Thomson and Johnson, 2006; Vlachos and Vrechopoulos, 2012, Aron *et al.*, 1989), VAIs now are not only performing the role of brands and retailers, but also redefining relationships among consumers, brands and firms, changing the way consumers make purchases and repurchases (Dawar and Bendle, 2018; Simms, 2019).

This article brings together theories on anthropomorphism, trust, emotional attachment, self-connection and self-disclosure in one conceptual framework. The article further establishes a consumer–VAI relationship, which has significant implications for grocery purchase satisfaction and intention to repurchase using VAIs. Building on the consumer-

centric view of the consumer-smart object interaction proposed by Hoffman and Novak (2018), the article empirically examines that as consumers form attachments with these anthropomorphized VAIs, they create strong emotional connections with the VAIs. Consumers, therefore, view these VAIs as "extension[s] of self" (Park *et al.*, p. 4), and they "may offload routine behaviors to smart objects" (Hoffman and Novak, 2018, p. 1192). The article subsequently explores the possibility that consumers' emotional attachments with VAIs have implications for both satisfaction with the purchase and intention to repurchase. The article subsequently takes this idea further in grocery purchase behavior, which, unlike other purchases, is a "customary activity" (Tauber, 1995, p. 59), requires regular purchases (Mortimer *et al.*, 2016) and most importantly, is of strategic importance to grocery retailers.

The study also introduces the concept of self-disclosure and establishes that consumers engage in high or low levels of self-disclosure during their task-related communications with VAIs. To address *when* consumers form emotional attachments with VAIs, the study thus proposes that when consumers indulge in high self-disclosure (vs low self-disclosure), they form stronger emotional attachments with VAIs, resulting in self-connection with VAIs and commitment to the relationship.

The objective of this article is threefold:

(1) to advance and extend the insights of the consumer–brand and consumer–object relationship literature by introducing the notion of anthropomorphized VAIs as relationship partners and providing theoretical and empirical support for the contention;

(2) to investigate the moderating role of consumers' self-disclosure to VAIs and their emotional attachments; and

(3) to propose a conceptual framework indicating *when* and *how* consumers' emotional attachments to VAIs result in purchase satisfaction and repurchase intention.

To accomplish these objectives, the article offers two studies: Study 1 serves as pretests to corroborate that consumers anthropomorphize VAIs, form emotional attachments with VAIs and engage in self-disclosure during their interactions with VAIs. Studies 2A and 2B serve as the main studies to examine the hypothesized relationships.

Davenport *et al.* (2020) pointed out that "marketing literature related to AI is relatively sparse" (p. 25), which is also evident from the brief overview of the research on VAIs (Table 1). Addressing this gap in the existing literature stream, the article thus makes three contributions: first, it introduces consumer–object emotional attachment to the novel concept of consumer–VAI relationships. Research on consumers' emotional attachments with objects and the implications for repurchase has gained popularity (Thompson *et al.*, 2006); however, there is little work examining the consumer–VAI relationship from the same lens in the existing literature. As VAIs are gaining prominence, consumer attachment to VAIs presents a timely contribution and extension to the attachment literature.

Second, the article proposes a conceptual framework that highlights *when* consumers form emotional attachments with VAIs and *how* the attachment-driven self-connections result in customer satisfaction and intention to repurchase using VAIs. It also addresses Belk's (2013) question: "whether virtual possessions are capable of attachment, self-extension and whether rituals of possession of material objects apply to virtual objects?" (p. 480).

Third, the article examines the use of VAIs for grocery purchase satisfaction and repurchase of groceries, which, from a practical standpoint, is important because of the

Table 1.
Overview of research on automated voice assistant/voice-activated devices

Author(s)	Research focus	Examined consumer–VAI relationship	Moderators	Consumer behavioral outcome(s)	Grocery purchases
Kowalczuk (2018)	Underlying mechanism of consumer acceptance of voice-activated smart speakers	No	No	Behavioral intention to use voice-activated smart speakers	No
Moriuchi (2018)	Factors influencing usage of voice assistants (VA) and their engagement with VAs	No	Yes-localization	Loyalty	No
Kim and Duhachek (2018)	Compared persuasions made by AI agents vs human agents and examined the difference in the construal level between an AI agent and human agent	No	AI agent's capability to learn	Intention to persuade	No
Gursoy *et al.* (2019)	Examined the influence of social influence, anthropomorphism, hedonic motivation, emotions, effort expectancy and performance on consumers' acceptance of artificially intelligent devices using the artificial intelligent device use acceptance theory	No	No	Customer's willingness to accept AIs for service delivery	No
Chattaraman *et al.* (2019)	Social vs task-oriented interactions with VAs on older consumers' trust, perceived ease of use and perceived interactivity	No	No	Behavioral intention to use VAs	No
McLean and Osei-Frimpong (2019)	Factors motivating the use of in-home voice assistants in terms of utilitarian, symbolic and social benefits	No	Yes – perceived privacy risk	Use of in-home voice assistants	No
Brill *et al.* (2019)	Customer expectations from virtual digital agents (VA) and confirmation of those expectations result in customers satisfaction	No, but examined customer satisfaction	No	Customer satisfaction with VA	No
Yang and Lee (2019)	Customers intention to adopt and use VA	No	No	Behavioral intention to use VA	No
Davenport *et al.* (2020)	Propose a framework of where AI today is and how it is going to evolve in the future	No	No	No	No
Klaus and Zaichkowsky (2020)	Research agenda brings attention toward the evolving role of voice AI in consumer choice decision-making and also its impact on service marketing and service research	Address positive emotions created by voice AI	No	No	No
Rhee and Choi (2020)	Examined the role of voice-based conversation agent as a personal assistant or social friend in product recommendations of low vs high involvement products	No, but examined the social role of conversational agents	No	Attitude toward products	No
Fernandes and Oliveria (2021)	Established that functional, social and relational elements have a positive influence on customer acceptance of digital voice assistants	Yes, trust and rapport	Yes, frequency of use and technology preference	Acceptance of digital voice assistants	No
Guha *et al.* (2021)	Highlight impact of AI in retailing and how voice AI such as Alexa and Google Home can play a role as a shopping channel for the retailers	No	No	No	No

increasing strategic partnership between grocery retailers and VAIs. Considering the investments retailers are making in partnering with VAIs, the article provides empirical confirmation that customers are satisfied with the purchases using VAIs and intend to use these VAIs to repurchase groceries.

The article proceeds as follows: it first introduces the conceptual framework supported by the relevant literature, followed by proposing the hypotheses. Next, the results are analyzed and discussed, followed by the conclusion, the study's theoretical and practical implications, proposals for future research and limitations.

2. Conceptual background and hypothesis development

2.1 Emotional attachment with voice-activated artificial intelligence assistants

The notion of emotional attachment is highly prevalent in the consumer behavior and marketing literature, which establishes that consumers form emotional attachments with brands and objects (Thomson *et al.*, 2005; Vlachos and Vrechopoulos, 2012). The desire to form emotional attachments is an innate human need that begins when infants make attachments with their mothers (Bowlby, 1980). It continues throughout life in relationships with friends, family, loved ones and brands (Thomson *et al.*, 2005). Emotional attachment is the emotion-laden bond that includes constructs such as affection, liking, passion, content and connection (Thomson *et al.*, 2005). People often form emotional attachments with their pets (Sable, 1995), celebrities (Thomson, 2006), brands (Fournier, 1998; Rauschnabel and Ahuvia, 2014) or cars (Grisaffe and Nguyen, 2011), which they perceive to have human-like features (Epley *et al.*, 2008). However, whether individuals form emotional attachments with VAIs similar to their attachments with other objects or brands remains unclear.

Consumers' emotional attachment to VAI, similar to their relationship with other objects and brands, can be viewed as their emotional bond with the VAI, where they attach the VAI with the self. As Fournier (1998) indicated in her study that similar to the relationship's individuals form with each other, consumers apply the same rubric of interpersonal relationships to their relationships with objects. The possibility that consumers can form an emotional attachment with VAIs can further our understanding of consumer interactions with the VAI and hence might predict their connection with the VAIs and their willingness to make future purchases using the VAIs.

2.2 Anthropomorphized voice-activated artificial intelligence assistants as relationship partners

Studies on brand personality (Aaker, 1997), consumer–brand relationships (Aggarwal, 2004) and brand love (Batra *et al.*, 2012) have established the role of brand anthropomorphism in consumer–brand relationships and its effect on consumer behavior, positive attitudes toward brands and the desire to form relationships with brands (Fournier, 1998). However, few studies have applied these concepts to AI devices or VAIs (Hoffman *et al.*, 2016). Hoffman and Novak (2017) contributed to the research on consumer–VAI interactions by establishing that consumers invest their emotional energy into AI devices, extending their identities to these objects, and hence treating these anthropomorphized VAIs as "close other identities or objects as if these were their own" (Hoffman and Novak, 2017, p. 1185).

Anthropomorphism also entails the perception that the humanized object has a mind of its own with associated consciousness, intentions and emotions (Epley *et al.*, 2007). Waytz *et al.* (2010) raised a very pertinent question about "why anthropomorphism matters" (p. 58). In answering that, they noted that "people show an impressive capacity to create human-like agents out of those that are clearly non-human" (p. 58). An expanding stream of research in marketing and psychology (Epley *et al.*, 2007; MacInnis and Folkes, 2017; Waytz *et al.*, 2010,

2014; Hoffman and Novak, 2018) points toward anthropomorphism as a process to understand consumer–object relationships and consumers' experiences with those objects. The concept of perceiving human presences in objects or "computers as social actors" is also prevalent in the human–computer interaction and human–robot interaction literature, which has focused on consumers' responses to computers as if they were humans and how features of robots or smart objects such as chatbots and robots result in particular consumer behaviors (Reeves and Nass, 1996; Araujo, 2018; Murphy *et al.*, 2019; Benlian *et al.*, 2019).

Anthropomorphism is very relevant to VAIs. As humans have a deep-seated tendency to anthropomorphize, it makes sense for marketers and retailers to anthropomorphize AI devices with voices, names or gender (e.g. Alexa), creating a perception that the object or brand is human-like. Moreover, marketers such as Amazon often label these humanized VAIs as intelligent, suggesting that these devices have their own will, have emotions, have intentions and care (MacInnis and Folkes, 2017). Consumers evaluate anthropomorphized objects that have features congruent with positive human schema, such as VAIs, positively and, they treat and respond to these humanized entities as they would to any human (Chandler and Schwartz, 2010). Anthropomorphizing VAIs, therefore, prompts consumers to experience VAIs emotionally, in the way they feel with any other human. We humans like cognitive consistency (Rauschnabel and Ahuvia, 2014), i.e. our minds prefer to be in situations where our attitudes and beliefs fit coherently together, explaining consumers' emotional attachment with objects. Therefore, the more human-like a VAI is, and the more cognitively consistent it is with other humans we love, the more likely we are to form emotional attachments with it the way we form emotional attachments with other humans.

Using the theoretical arguments presented above, the article proposes that consumers develop a feeling of connectedness and closeness with VAIs during their interactions, which are the emotional component of relationships and which also include elements of love such as liking, affection and connectedness (Thomson *et al.*, 2005; Thomson, 2006). Therefore, as consumers interact with these anthropomorphized VAIs, one can conceptually argue that they use the guiding principles of their intrapersonal relationships to form emotional attachments with these devices. It can be further argued that such attachments are characterized by various emotions such as love, affection, passion, connection and delight. (Slater, 2001; Thomson *et al.*, 2005). Hence, the following hypothesis:

H1. The more consumers perceive VAIs as anthropomorphized, the greater their emotional attachment with these VAIs.

2.3 Trust in the consumer–voice-activated artificial intelligence assistants relationship

Trust is an essential component of any relationship; even Bowlby (1979), in his attachment theory, contended that trust impacts the foundation of relationships from early on when infants form emotional attachments with their mothers. Given the relevance of trust in a relationship, Rempel *et al.* (1985) established that trust results in "satisfying interaction and increased confidence in the relationship" (p. 96). According to this dyadic perspective, trust is a psychological orientation of the trustors' toward the trustee, which evolves from interactions and is driven by the dependability of and faith in the relationship. As consumers continue building relationships with anthropomorphized entities, they develop trust in these objects as they would develop trust in another person that they find reliable and dependable. As individuals in a relationship become confident about the permanence of the relationship, they develop faith in the relationship and feel that the partner is trustworthy and reliable. As this faith grows and individuals increase their reliance on the partner or target object, trust evolves, which lays the foundation for emotional attachment.

The relational link between trust and emotional attachment can be better understood in the context of the relationship between a human infant and its mother. Bowlby (1979) stressed that the extent to which human infants form emotional attachments with their mother depends on the mother's ability to fulfil the infant's needs consistently and continually. Hence, reliability, credibility and dependability are key dimensions of the emotional attachments that infants form with their mothers (Burke and Stets, 1999; Hazan and Shaver, 1994). Trust, therefore, provides the foundation for emotional attachments that humans first experience as infants. Later in life, these dimensions of trust and emotional attachment are routinely transferred to their relationships with other humans and even objects or brands (Thomson, 2006), a key component for the foundation of relationship marketing (Morgan and Hunt, 1994).

Existing research on trust (Moorman *et al.*, 1993; Morgan and Hunt, 1994; Ganesh and Hess, 1997; Wirtz *et al.*, 2018) has established trust as an important component of a relationship, which reflects focal partner's credibility and trustor's dependability and reliance on the partner. These researchers have conceptualized trust as an expectancy held by the individual in the relationship that the partner's verbal statement can rely on (Rotter, 1971).

Existing conceptualizations of trust allows us to expand the concept of trust beyond human–human interactions to our interaction with technologies such as AI (Wang *et al.*, 2016; Glikson and Wooley, 2020). Consumers' relationship with the VAIs, similar to their other online relationships, consists of intentional and regular interactions (Steinhoff *et al.*, 2019), such as disclosing self-information or task-related information. Kracher *et al.* (2005) outlined that these interactions or communications are key for trust development, which then reflect the credibility of the focal partner in the relationship to keep the promises, and that person in the relationship can depend and rely on the relationship partner. Extending the concept of trust in the context of technology such as AIs, Hoff and Bashir (2015) argued that to better understand consumers' relationship with the technology or AIs, it is essential to examine emotion-driven trust between consumers and the technology. Marketing literature has also highlighted that this conceptualization also addresses consumer need for safety in social exchanges in a way that "to say that A trusts B means that A expects B will not exploit a vulnerability A has created for himself by taking action" (James 2002, p.291). Thus, as Hazan and Shaver (1994) pointed out, for attachment to be formed in a relationship, the focal partner should promote safety and instill confidence that the individual can rely on the focal partner. Building on these established contentions about the role of trust as a positive antecedent of emotional attachment (Vlachos *et al.*, 2010), the study hypothesizes:

H2. Individuals' trust in VAIs positively influences their emotional attachment with VAIs.

2.4 Consumer self–voice-activated artificial intelligence assistant connection

The article's central proposition is that consumers form emotional attachments with VAIs similar to their attachment to brands or objects. Consumers view this bond as representing their self-identity, creating a "symbolic meaning" associated with the extension of their self-identity (Kiesler and Kiesler, 2005, p. 365). Consumer research on self-extension (Belk, 1988) has established the importance of possessions with which consumers make connections, and it has posited that individuals weave possessions, whether it is the possession of the object, places or people, into their own self. Expanding this concept further, Belk (1988) proposed that the "function that possessions play in the extended self involves the creation, enhancement, and preservation of a sense of identity" (p. 150). It is accepted in consumer research that consumers possess products or objects for their functional benefits and their

psychological and symbolic benefits (Sirgy *et al.*, 2008; Escalas, 2004). One reason why psychological and symbolic benefits in products are essential for consumers is that they can help consumers create their self-identity. Hence, they can satisfy consumers' psychological need to express their self-identity and develop their self-concept, which allows them to connect with brands and objects with which they form attachments to meet their self-driven goals (Escalas, 2004; Belk, 1988; Kiesler and Kiesler, 2005; Fournier, 1998).

The article proposes a self–VAI connection in the same vein as a self–brand connection (Escalas, 2004; Harrigan *et al.*, 2018), which means that VAIs (with which the individual forms an attachment) have an emblematic meaning associated with that individual's self-identity and thus represent an extension of the individual's self. Consumer researchers have recognized the importance of consumers' self and their association with objects and brands. For example, Belk (1988) posited that consumers extend themselves into people, places and objects in his concept of self-extension. Kleine and Baker (2004) proposed that as consumers extend their self-identity into objects, they decommodify these objects and, in the process, personalize them to symbolize autobiographical meaning in a way that reflects the consumer's self-aspect. Analogously, VAIs, in this sense, can therefore satisfy consumers' psychological need to express self-identity. Subsequently, when consumers interact with and make associations with VAIs to meet self-driven goals such as asking for recipes or reordering groceries, consumers can establish a connection between their aspect of self and VAIs, extending self into this relationship. The importance of self-connection in customer engagement results from customers' interactions with the service firm; hence, loyalty is well researched in the service research literature (Bordie *et al.*, 2011; Harrigan *et al.*, 2018). However, consumers' self-connection with VAIs as a result of their attachment to VAIs lacks similar attention and hence, based on the theoretical underpinning, the current study argues that when consumers form emotional attachments with VAIs, they may identify themselves with the VAIs and, in sum, the stronger the emotional attachment, the greater the consumer self–VAI connection:

H3. Consumers' emotional attachment to VAIs is positively related to consumers' self–VAI connection.

2.5 Satisfaction

From a relationship perspective, the outcome of a relationship, whether satisfying or not, depends on whether it met an individual's expectations from that relationship. As Rusbult (1980) stated, satisfaction is the "degree of positive affect associated with the relationship" (p. 174). Thomson *et al.* (2005) elaborated on this positive effect of a relationship in terms of emotional attachment, stating that "an individual who is emotionally attached to a brand is likely to be satisfied with it" (p. 80). The consumer psychology and marketing literature has stressed that emotions "capture the defining tone of consumer satisfaction" (Fournier and Mick, 1999, p. 16). However, the theoretical justification for *how* emotional attachment relates to customer satisfaction is limited (Klein and Baker, 2004; Mugge *et al.*, 2010). This article, therefore, argues that consumers' self–VAI connection should play a central role in creating post-purchase satisfaction.

Consumer self-connection with VAIs (as argued above) results when consumers see an extension of self-identity in the VAIs. Consumers' self-extension, as put forth by Hoffman and Novak (2018) in their conceptual framework about consumer-smart devices assemblage, is in accordance with the consumers' "agentic orientation" in the assemblage (p. 1185). They further elaborated the importance of consumers' agentic role in the assemblage by stating that agency, when associated with consumers' self-identity, is important for consumers'

"self-related goals" (p. 1185). Agentic orientation, therefore, involves instrumentality and dominance in the quest for the extension of self-identity (Abele and Wojciszke, 2007; Judd *et al.*, 2005; Hoffman and Novak, 2018). In consumer self–VAI connection, consumers extend their self-identity in the VAIs, and in the process, they express agentic orientation by asserting themselves in the relationship. Consumers, therefore, transfer their capacity of completing their self-related goals to VAIs in a way they inject their self-identity into their relationships with VAIs. For example, in the scenario presented at the beginning of the article, *Jane*, when interacting with Alexa and asking Alexa to repurchase groceries, shifts from her self-role of repurchasing groceries to an agentic self-expressive role in which she transfers her capacities into her relationship with Alexa. Analogous to Belk's (1988) suggestion, this extension of self into the VAI as a result of consumer self–VAI connection, therefore, may provide a deeper understanding of consumers' post-purchase "fulfilment response" (Oliver, 1980, p. 8) in terms of whether the grocery shopping experience met their expectations and they were satisfied with the purchase. Accordingly, the following hypothesis is proposed:

H4. Consumers' self-connection with VAIs positively influences their satisfaction with grocery purchases using VAI.

2.6 Intention to repurchase using voice-activated artificial intelligence assistants

After purchasing groceries using VAIs, consumers develop an attitude based on their purchase satisfaction. This attitude forms the basis of consumers' next purchase expectations or their intention to repurchase. Customer satisfaction, according to Oliver (1997), is a cognitive and affective response consumer develop after the current transaction or accumulate over time, and "the expectation, not the need, is what consumers bring to the repurchase" (p. 68). The existing literature on repurchase intention (Yi and La, 2004) has focused on the relationship between satisfaction with purchase and intention to repurchase where customers are involved directly, but the current literature is silent on consumers' agentic role in creating this relationship. Using theoretically established arguments about the customer satisfaction–repurchase intention link (Yi and La, 2004), this article proposes that as consumers create self-connection with VAIs and extend their self-identities into their VAIs, their post-purchase satisfaction using VAIs creates a positive attitude toward future purchases using VAIs and hence their intention to repurchase using VAIs:

H5. Consumers' satisfaction with purchasing groceries using VAIs positively influences their intention to repurchase groceries using VAIs.

2.7 Moderating role of self-disclosure

In his seminal work on the subject of self-disclosure, Jourard (1964) introduced the disclosure of self-relevant facts, which he termed self-disclosure as the foundation of relationships and a means for heightening relationships (Reis and Shaver, 1988). Decades of research on self-disclosure have established that it significantly contributes to interpersonal relationships and promotes emotional attachment (Kreiner and Levi-Belz, 2019). As Wheeless and Grotz (1976) stated, "a self-disclosure is any message about the self that a person communicates to another" (p. 338). This assertion is especially true of today's virtual networks, where individuals connect and form relationships by sharing information about self (Seo *et al.*, 2019). Consequently, self-disclosure is not constrained to intimate communications; rather, the extant literature has extended the concept of self-disclosure along a variety of dimensions ranging from disclosing

everyday information (such as "I am out of milk") in pursuit of the goal that the person disclosing has set for the partner in the relationship, and for him or herself (Greene *et al.*, 2006). These positive expectations of goal-driven self-disclosure(s) result in warm feelings about interactions between partners in a relationship dyad, which can "either mitigate or enhance the perceived valence of [the] subject's disclosure" (Moshggou, 1982, p. 30) as individuals include "any information exchange that refers to self" (Mikulincer and Nachshon, 1991, p. 322). The breadth or the amount of the disclosure differs according to the goal of disclosure (Chelune, 1975; Wheeless and Grotz, 1976) and, therefore, is a function of the duration and the frequency of the disclosive message (Wheeless and Grotz, 1976; Kreiner and Levi-Belz, 2019). Motivated this way by the disclosure goal, individuals often engage in exchanges of incrementally greater amounts of information with the anticipation that the relationship's outcome will be fruitful and rewarding (Omarzu, 2000).

Stressing that self-disclosure is any self-related information exchange consumers may engage in during their communication with VAIs, the article incorporates this popular concept into the current context to deepen the understanding of the underlying process of consumers' relationships with VAIs. Hence, when individuals interact with VAIs, when the task at hand motivates them, they engage in communication with VAIs. In the self-disclose process, as in the example presented earlier, Jane discloses her need for easy recipes. Considering individual differences in the extent to which individuals are likely to engage in self-disclosure with VAIs, the extant literature has also documented that self-disclosure is dependent on and manifested by the duration of disclosure, depth of disclosure and self-disclosure situation (Mikulincer and Nachshon, 1991; Omarzu, 2000). Therefore, as agreed by researchers, self-disclosure is verbal (Omarzu, 2000) and is at the core of an interpersonal relationship (Kreiner and Levi-Belz, 2019).

2.7.1 Self-disclosure moderates the relationship between anthropomorphized voice-activated artificial intelligence assistants and emotional attachment. The extent and content of self-disclosure are also significant links in the interpersonal relationship (Cozby, 1972; Collins and Miller, 1994; Mikulincer and Nachshon, 1991). Cozby (1972) established a curvilinear relationship between disclosure and liking; hence, liking is likely to be strongest when the disclosure is moderate compared to a weak or highly intimate (Cozby, 1972; Collins and Miller, 1994). Therefore, in situations where the extent of self-disclosure is high and associated with fulfilling a need of "self" or the family, individuals engage incomparably higher amounts of self-disclosure than they do in immediate, task-driven interactions. Hence, extending the earlier-stated argument about the relationship between self-disclosure and liking, which Shimp and Madden (1988) referred to as an essential component of emotional attachment, and providing empirical support for the question raised by Tardy (1988) as to whether an increased extent of disclosure results in increased emotional attachment, it can be hypothesized that:

H6a. Self-disclosure moderates the relationship between anthropomorphized VAIs, and the emotional attachment consumers form with VAIs, in that higher levels of self-disclosure enhances the effect of VAIs' anthropomorphism on emotional attachment.

2.7.2 Self-disclosure moderates the effect of trust on emotional attachment. Consumers in a trusting relationship form emotional attachments and follow the rubric of attachments, such as indulging in disclosive communication or self-disclosure (Deutch, 1958; Wheeless and Grotz, 1977), disparately limiting or inhibiting disclosures if the trust is lacking in the relationship. Moreover, there is evidence in the extant self-disclosure literature that the extent of disclosure affects the level of trust in the relationship (Tardy, 1988). Building on the consensus in the extant literature that a relationship exists between self-disclosure and

trust, and that enhanced disclosive communication results in increased trust (Wheeless and Grotz, 1977), the study hypothesizes:

H6b. Self-disclosure moderates the relationship between trust in VAIs and the emotional attachment consumers form with VAIs in that a higher level of self-disclosure multiplies the effect of trust on the emotional attachment.

3. Conceptual framework

Summarizing the relationship linkages proposed and supported by the conceptual background, the article proposes the following conceptual framework (Figure 1).

4. Studies overview

The article consists of two studies: Study 1 and Study 2 (A and B). Study 1 (pretests) establishes whether individuals who own the VAI devices perceive these VAIs as humanized relationship partners (i.e. whether they anthropomorphize these devices) and engage in self-disclosure during tasks-based interactions.

Study 2A serves three purposes: first, it examines *whether* anthropomorphism and trust in consumers result in emotional attachment with VAIs (*H1–H2*). Second, it examines the moderating effect of self-disclosure on anthropomorphism (*H6a*) and trust (*H6b*), thus addressing "when" consumers form a strong emotional attachment with the VAIs. Third, check whether gender, age and customer ownership of VAIs have a confounding effect on hypothesized relationships.

In Study 2B, the partial least squares structural equation modeling (PLS-SEM) methodology was used to examine the conceptual framework (Figure 1) and address *how* consumer–VAI emotional attachment results in satisfaction and intention to repurchase using the VAI. The study, therefore, re-examines *H1–H2*, in addition to examining *H3–H5*. Also, a multigroup analysis was conducted in Study 2B to re-examine (*H6a* and *H6b*) the moderating role of self-disclosure. To do so, the sample population was divided into two groups: Group 1 corresponded to low self-disclosure and Group 2 corresponded to high self-disclosure to the VAIs.

5. Study 1: pretests

The pretest served two purposes:

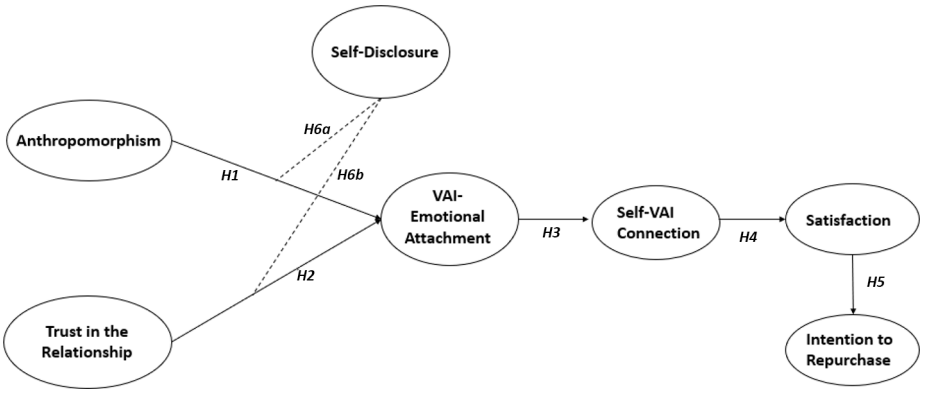

Figure 1. Effect of consumer–VAI emotional attachment on customer satisfaction and repurchase intention

(1) to affirm postulations made in the study that these VAIs are perceived human-like (anthropomorphized) and that consumers make emotional attachments with these VAIs; and

(2) to investigate consumer self-disclosure with the VAIs during task-based communication.

Anthropomorphism was measured using measurement items adapted from Kim and McGill (2011), Epley *et al.* (2007) and Waytz *et al.* (2014), and consumer emotional connection to VAIs was measured using items adapted from Rauschnabel and Ahuvia (2014), namely, "felt emotionally connected" and "feels like an old friend." After the identification of the tasks in the first pretest, a second pretest was conducted to examine whether during these task-related communications with VAIs consumers engaged in self-disclosure, and whether this self-disclosure was higher or lower as measured by assessing the self-disclosure total word count and self-disclosure situational analysis (Kreiner and Levi-Belz, 2019).

For both pretests, data were collected from Amazon Mechanical Turk (MTurk) for a nominal fee. The sample was collected within the USA and included individuals with human intelligence task (HIT) approval rates greater than 95% and more than 50 approved HITs. A screening question was asked to determine whether the respondent owned a VAI. The sample thus contained respondents who had a VAI in the home. The sample was appropriate for the study since, according to US Census Bureau data, the number of voice-activated smart speakers is nearly the same as the number of households in the USA, and many households with people between the ages of 18 and 53 own at least one VAI (Nielsen Media, 2018; Moriuchi, 2019).

5.1 Pretest of anthropomorphism and emotional attachment

In the first pretest, respondents (N = 252) were asked to write in detail about their interaction(s) with their VAIs. All respondents were also asked to indicate the tasks for which they used their VAIs in addition to the task options provided based on popular uses for VAIs (Capgemini Research Institute, 2018). Of the respondents, 93% indicated they owned a voice-activated device, and 50.23% of those owned Alexa. Further, 55.56% of the respondents (N = 140) were male, and 44.4% (N = 112) were female. The mean age of the respondent was 35.38 years, and 81% (N = 204) of the respondents were employed. Respondents' responses were analyzed using the Linguistic Inquiry and Word Count (LWIC) text analysis program (Pennebaker *et al.*, 2007) to identify the valence of their emotions toward their VAIs and any indication that respondents perceived their VAIs as humanized as measured by analyzing the use of personal pronouns – "he," "she" – in their responses (Kwon and Sung, 2011). The results showed that respondents expressed positive emotions when describing their interactions with their VAIs ($M_{\text{Positive Emotion}}$ = 4.12; $M_{\text{Negative Emotion}}$ = 0.58). Also, the analysis of respondents' responses showed that 9.7% of the responses contained personal pronouns, i.e. "she," "he," "they" and 4.73% contained impersonal pronouns such as "it." Also, anthropomorphism and emotional attachment were strongly correlated (r = 0.767, $p < 0.001$). The results also indicate that for grocery shopping-related communication, customers evaluated the VAI to be more human-like (r = 0.211, $p < 0.05$) and formed strong emotional attachments (r = 0.188, $p < 0.05$) (Tables 2 and 3).

5.2 Pretest of self-disclosure

In the second pretest, the study investigated whether consumers engaged in self-disclosure during their task-based communication and whether grocery shopping-related

	Anthro*	Grocery shopping	Playing music	Checking weather	Checking news	Checking time and date	Traffic update	Requesting ride/taxi	Finding flight information	Setting room temperature	Managing lighting in the house
Pearson correlation	1	0.211**	–0.21**	0.324**	0.127*	–0.136*	0.089	0.158*	0.108	0.168**	–0.019
Sig. (2-tailed)		0.001	0.001	0.00	0.044	0.031	0.158	0.012	0.087	0.008	0.770

Notes: *Anthro = anthropomorphism

Table 2.
Pretest 1: correlations between anthropomorphism and tasks

Table 3.
Pretest 1: correlations between emotional connection and tasks

	EA*	Grocery shopping	Playing music	Checking weather	Checking news	Checking time and date	Traffic update	Requesting ride/taxi	Finding flight information	Setting room temperature	Managing lighting in the house
Pearson correlation	1	0.188**	–0.15**	–0.247**	0.164**	–0.125*	0.041	0.122	0.057	0.114	–0.057
Sig. (2-tailed)		0.003	0.018	0.00	0.009	0.047	0.521	0.052	0.367	0.071	0.368

Note: * EA = emotional attachment

communication involved more self-disclosure. Totally, 187 US consumers who participated in the pretest (recruited via MTurk) were asked questions about their self-disclosure during task-based communications with the VAIs. Further, 57.2% of the respondents (N = 1107) were male, and 43% (N = 80) were female. The mean age of the respondent was 34 years, and 77% (N = 143) of the respondents were employed.

Scales for measuring self-disclosure were adapted from the self-disclosure situation survey proposed by Chelune (1976) and Harris *et al.* (1999), which "measures the situational determinants of self-disclosure to individuals" (Moshggou, 1982, p. 29). Respondents were asked to indicate self-disclosure on a scale adapted from Harris *et al.* (1999), using a seven-point Likert-type scale, where 1 = *I would be willing to share or discuss only on a superficial level* and 7 = *I would be willing to disclose in complete detail in a such a way that [the VAI] truly understands my needs and thoughts* (Appendix 1). As Kreiner and Levi-Belz (2019) suggested, self-disclosure can be measured by the "total number of words produced" during a disclosure. Respondents were asked to write in detail about their communications with their VAIs for each of the tasks. The study again used LWIC to analyze the total word count for each. The results indicated that consumers engage in higher self-disclosure for tasks such as grocery shopping and playing music (Table 4).

The pretests' findings increased confidence in the study's assumptions that consumers view these VAIs as human-like and form emotional attachments with them, and that they engage in self-disclosures. The pretest also established that for certain tasks, such as grocery shopping, customers indicated a strong emotional attachment with the VAI, engaging more self-disclosures than any other tasks. These results support the earlier arguments that during interactions with anthropomorphized VAIs – imbued with human-like voices, have human names and are actively responsive – individuals follow the same rules for interpersonal relationships that they use for emotional attachments to brands, objects and other humans. Moreover, the findings indicated that for some tasks, such as grocery shopping-related tasks, consumers indicated a higher level of self-disclosure than other tasks such as controlling the lights. The following studies examine whether and when anthropomorphism and trust in the VAI result in emotional attachment with these VAIs when used for grocery shopping-related tasks.

6. Study 2A

This study aimed to establish the main effect of the predictor variables, anthropomorphism and trust, on emotional attachment (*H1* and *H2*), and the moderating effect of self-disclosure on the effect of predictor variables on the consumer–VAI emotional attachment (*H6a* and *H6b*). In addition to testing the hypotheses, the study also examined the confounding effects of whether they own a VAI or not, gender and sex.

6.1 Experimental design

To construct a between-subject experimental context that allows for VAI to be experienced in a grocery shopping scenario, the online sample was randomly shown one of two videos; one grocery purchase using VAI (Alexa) and other online grocery shopping using the traditional way, using laptop and mobile phone (control condition). In the VAI grocery shopping condition, customer interaction with Alexa was shown. This condition showed how the person in the video indulges in task-based communication in complete detail so that Alexa seems to understand her needs and thoughts. In the control condition, a traditional way of grocery shopping was shown, which is to shop for groceries online using a laptop and mobile phone (a detailed description of the experimental design can be found in Appendix 2).

Table 4.
Pretest-2: task-related self-disclosure

	Playing music	Checking weather	Requesting ride/ taxi	Grocery shopping	Managing lighting in the house	Setting room temperature	Checking news	Traffic update	Finding location
Mean	4.41	4.09	3.35	3.90	3.18	3.11	3.99	3.73	4.33
Median	5.00	4.00	4.00	4.00	3.00	2.00	4.00	4.00	5.00
Std. deviation	1.961	2.109	2.164	2.196	2.132	2.107	2.040	2.025	2.088
Word count (LWIC)	1,978	1,794	1,685	3,140	986	645	1,935	1,412	1,481

6.2 Sample

Online survey-based data were collected from MTurk for a nominal fee. The sample was collected within the USA, and it included individuals who had HIT approval rates greater than 95% and more than 50 approved HITs. To maintain the survey's quality, a screening question was asked; respondents were asked to indicate how the person in the video performed grocery shopping.

A total of 200 respondents were recruited against monetary compensation, and 176 were deemed usable for the analysis. The remaining 24 respondents either did not go through the attention check or did not complete the survey. Respondents were between 23 and 60 years old, M_{Age} = 37 years (Mode = 30 years), 69% of the respondents were male and 31% female. Of these respondents, 71% owned a voice-activated device. Of these 71% respondents, 60% used Alexa, 19% used Google Home, 14% used Amazon Echo and 7% indicated Siri as their VAI choice.

After watching the videos, respondents were randomly presented with one of two videos. They were then asked to imagine purchasing groceries as shown in the video and complete the survey questions presented in random order.

6.3 Measurement scales

Anthropomorphism was measured on a seven-point Likert-type scale where 1 = *strongly disagree* and 7 = *strongly agree* using measurement items adapted from Kim and McGill (2011), Epley *et al.* (2007), Waytz *et al.* (2014) and Fournier (1994). Participants indicated how human-like they felt the stimulus in response to the prompts: please indicate the extent you felt [. . .] has its own free will, has emotions, has intentions, understands what is important to me, knows what I expect (Cronbach $\alpha = 0.89$). The emotional attachment was measured on a seven-point Likert-type scale where 1 = *does not describe my feelings* and 7 = *clearly describes my feelings* using items proposed by Thomson *et al.* (2005): [. . .] is affectionate, friendly, delighted, bonded, loved (Cronbach $\alpha = 0.91$). Trust was measured using the four-item index recommended by Chaudhuri and Holbrook (2002): You can trust[. . .], You can rely on [. . .], [. . .] is honest (Cronbach $\alpha = 0.83$). Respondents were asked to rate these statements using a seven-point Likert-type scale where 1 = *strongly disagree* and 7 = *strongly agree*.

Respondents were also asked to imagine the experimental scenario, and then based on the task-based communication as shown in the scenario, respondents were asked to indicate how much they would be willing to self-disclose on a scale adapted from Harris *et al.* (1999), using a seven-point Likert-type scale, where 1 = I would be willing share or discuss only on a superficial level and 7 = I would be willing to disclose in complete detail in a such a way that [. . .] truly understands my needs and thoughts

6.4 Results

An independent *t*-test was performed to analyze any difference between the treatment and control conditions in terms of anthropomorphism, trust, emotional attachment and self-disclosure. The result indicated that customers perceived VAIs to be more human-like ($M_{Alexa} = 4.93$, $M_{Traditional\text{-}online} = 2.98$, $p < 0.001$), form more trust ($M_{Alexa} = 5.47$, $M_{Traditional\text{-}online} = 4.55$, $p < 0.001$), emotional attachment ($M_{Alexa} = 4.61$, $M_{Traditional\text{-}online} = 3.12$, $p < 0.001$) and indulged in more self-disclosure ($M_{Alexa} = 1.35$, $M_{Traditional\text{-}online} = 1.17$, $p = 0.005$).

In addition, the main effects of the independent variables, anthropomorphism and trust, on dependent variable emotional attachment (*H1* and *H2*) and the moderating effect of self-disclosure (*H6a* and *H6b*) was tested with two distinct bias-corrected bootstrap moderation models (Model 1; Hayes, 2013). The confounding effects of respondents' gender, age and

whether they own a VAI or not were also examined to control for possible confounders in the hypothesized relationships.

6.4.1 The main effect of anthropomorphism and moderating effect of self-disclosure. In support of *H1*, anthropomorphism has a significant main effect on emotional attachment ($b = 0.54$, $t\,(176) = 3.92$, $p = 0.00$), and as predicted, there was a significant interaction effect between anthropomorphism and self-disclosure ($b = 0.182$, $t\,(176) = 2.43$, $p = 0.05$), supporting *H6a*. Furthermore, gender ($t = -0.31$, $p = 0.76$), age ($t = 1.04$, $p = 0.23$) and whether own a VAI or not ($t = -0.44$, $p = 0.66$) had no significant confounding effect on effect of anthropomorphism on emotional attachment.

6.4.2 The main effect of trust and moderating effect of self-disclosure. In support of *H2*, trust has a significant main effect on emotional attachment ($b = 0.52$, $t\,(176) = 2.96$, $p = 0.003$). As proposed, there was a significant interaction effect between trust and self-disclosure ($b = 0.43$, $t\,(176) = 2.16$, $p = 0.03$), supporting *H6b*. Similar to the earlier findings, gender ($t = -0.82$, $p = 0.41$), age ($t = -0.16$, $p = 0.87$), and whether own a VAI or not ($t = -0.84$, $p = 0.66$) did not act as confounders on the effect of trust on emotional attachment.

6.5 Discussion

Study 2A provided support for the contention that imbuing VAIs with human-like characteristics and being reliable and credible in fulfilling customers goal led to customers trust in VAIs, resulting in consumer–VAI emotional attachment. Furthermore, the supporting result for the moderation by self-disclosure extends support to the article's contention that when self-disclosure is higher, the effect of anthropomorphism and trust on emotional attachment is also higher. Consumers who communicate personally relevant information tend to place more trust in VAIs, see them more like a human and create stronger emotional ties with VAIs than those who indulge in less self-disclosure. Contrary to the findings in the extant literature on technology acceptance that gender and age can influence individuals' attitudes and beliefs about technology (Morris *et al.*, 2005), the study also established that gender and age of consumers did not have any confounding effect on consumer–VAI attachment. One plausible reasoning for this finding could be that most of the respondents were within the age group 30–37 years old (M_{age}= 37 years), and according to recent studies on the adaption of technology such as autonomous devices, millennials (people born in the 1980s till 2000s) are more adaptive to new technologies (Liébana-Cabanillas *et al.*, 2014; Bilgihan, 2016) and more likely to use these virtual assistants compared to the baby boomers (Tuzovic and Paluch, 2018).

Study 2A, therefore, empirically established the effect of anthropomorphism and trust on creating an emotional attachment with VAIs, and the moderating effect of self-disclosure. The study, however, did not answer *how* emotional attachment is instrumental in creating grocery purchase satisfaction and intention to repurchase. Therefore, the aim of Study 2B is to reconfirm the findings of Study 2A and establish *how* consumers' emotional attachments result in their post-purchase satisfaction and the intention to repurchase.

7. Study 2B

7.1 Sample

Sample for Study 2B was collected from Amazon MTurk for a nominal fee, following the same selection criteria of seeking respondents who own a voice-over device. A total of 300 respondents were recruited against monetary compensation, and 288 were deemed usable for the analysis. The remaining 12 respondents either did not own a VAI or did not complete the survey. Respondents were between 18 and 68 years old, M_{Age} = 38 years; 65% of the respondents were male and 35% female. Respondents were also asked to identify their VAIs

and whether they use VAIs for grocery shopping. Of these respondents, 42.4% indicated that they have Alexa, 32.6% have Google Home, 8.7% have Amazon Echo and 16.3% indicated Siri as their VAI choice. Some 88% of respondents indicated that they use their VAIs for ordering/reordering groceries.

7.2 Measurement scales

The scales for anthropomorphism, emotional attachment and trust were the same as those for Study 1 (Table 4). The Cronbach α for anthropomorphism was 0.86; for emotional attachment, it was 0.87; and for trust, it was 0.88. The amount of self-disclosure was measured by items adapted from Wheeless and Grotz (1976) rated on a seven-point Likert-type scale where 1 = *strongly disagree* and 7 = *strongly agree,* namely, My conversations with [indicated choice of VAI] are usually brief, my conversations with [indicated choice of VAI] last for a short time, my conversations with [indicated choice of VAI] reveal mostly what I like or want, only infrequently do I express in complete detail about what I really want from [indicated choice of VAI], my disclosures with [indicated choice of VAI] are incomplete detail, directed to the task (Cronbach $\alpha = 0.72$).

The measurement scales for self-connection were adapted from Escalas and Bettman (2003) (Table 4) (Cronbach $\alpha = 0.89$). Satisfaction was adapted from Fornell (1996) and Sung and Choi (2010) (Table 5) (Cronbach $\alpha = 0.814$). Intention to repurchase groceries using VAIs was measured by scales adapted from Yi and La (2004) (Table 5) (Cronbach $\alpha = 0.88$). Seven-point scales were used for all the responses.

7.3 Methodology

A PLS approach was used to analyze the structural components of the proposed measurement and causal model (Henseler *et al.*, 2009); the data were analyzed with a PLS approach using smartPLS (Ringle *et al.*, 2005). As suggested in the extant literature (Rose *et al.*, 2012, Shmueli *et al.*, 2019), the PLS approach is appropriate for testing and validating the hypothesized relationship in path models consisting of both latent and established variables that couples exploration with explanation (Shmueli *et al.*, 2019). PLS-SEM is becoming a widely used regression-based technique in the marketing and other social sciences (Lohmöller, 1989; Wold, 1985; Hair *et al.*, 2017b; Shumeli *et al.*, 2019). Compared to the covariance-based SEM (Jöreskog, 1978; Rigdon, 1998; Diamantopoulos and Siguaw, 2000), PLS-SEM is a "causal-predictive" method (Jöreskog and Wold, 1982, p. 270), which "maximizes the amount of explained variance of the endogenous constructs embedded in a path model grounded in well-developed causal explanations" (Shumeli *et al.*, 2019, p.2323). PLS-SEM results, therefore, are well suited for "both [an] understanding of [the] underlying causes and prediction, as well as [a] description of [the] theoretical constructs and the relationships among them" (Gregor, 2006, p. 626).

7.4 Results

7.4.1 Model validity and reliability. All the constructs in the measurement model were tested for reliability and validity. The predictive validity of the scales was reported as factor loadings in PLS; all the reflective constructs used in the measurement model had factor loadings ≥ 0.70, which confirmed the model's predictive validity (Hair *et al.*, 1995) (Table 4). Construct validity was assessed using composite reliability, convergent validity and discriminant validity. Composite reliability was in the range of 0.87–0.95. Convergent validity was measured using the average variance extracted (AVE), which was in the range of 0.6–0.88, thus meeting the minimally acceptable AVE criterion (Fornell and Larcker, 1981). In addition to rule out any common method bias in the model, variance inflation factor

Table 5.
Factor loadings (VIF), AVE and CR

	Anthropomorphism	Emotional attachment	Trust	Self-connection	Satisfaction	Intention to repurchase
Anthropomorphism						
. . . have its own free will	0.820 (2.01)					
. . .have emotions	0.852 (2.30)					
. . .have intentions	0.803 (1.95)					
. . .understand what is important to me	0.775 (1.69)					
. . .knows what I expect	0.7691 (1.72)					
Emotional attachment						
Affectionate		0.800 (1.92)				
Friendly		0.743 (1.66)				
Delighted		0.823 (2.12)				
Bonded		0.853 (2.39)				
Loved		0.843 (2.45)				
Trust						
you trust. . .			0.872 (1.92)			
You can reply on. . .			0.839 (1.77)			
. . .is honest			0.866 (1.87)			
Self-connection						
. . .reflects who I am				0.888 (2.66)		
I can identify with. . .				0.861 (2.29)		
I feel a personal connection with. . .				0.846 (2.09)		
. . .matches my personality				0.860 (2.29)		
Satisfaction						
How satisfied/dissatisfied were you with. . .when used for grocery purchase (very dissatisfied/very satisfied)					0.785 (1.64)	
To what extent purchasing grocery using. . .met your expectations (not at all/totally)					0.823 (1.87)	
How near or far was . . .from your ideal way of grocery purchase (very far/cannot get closer)					0.801 (1.81)	
Shopping for groceries using. . .makes me happy					0.794 (1.66)	
Intention to repurchase						
Intend to use. . .. again, for purchasing groceries (not at all/quiet a lot)						0.944 (2.54)
Probability of using. . .again for purchasing groceries (not at all/quite a lot)						0.942 (2.53)
Construct reliability and validity						
Cronbach α	0.863	0.871	0.823	0.886	0.814	0.876
AVE	0.647	0.661	0.738	0.746	0.641	0.890
Composite reliability	0.902	0.907	0.894	0.922	0.877	0.942

(VIF) was generated for all the latent variables (Kock, 2015). VIF obtained for the latent variable was lower than 3.3 and recommended by Kock (2015), "all VIFs resulting from a full collinearity test are equal to or lower than 3.3, the model can be considered free of common method bias" (p. 7).

Using Fornell–Larcker's (1981) criteria, tests for discriminant validity confirmed the constructs' discriminant validity (Table 6).

7.4.2 Goodness of fit. In the study, the model quality was estimated by how well the model could predict the constructs. The model was estimated based on the coefficient of determination (R^2), effect and cross-validated by redundancy Q^2 (Hair *et al.*, 2014) (Table 7). Model predictivity was measured using R^2, which represents the combined effect of the exogenous variable on the endogenous variable and is viewed as an evaluative criterion for the structural model (Hair *et al.*, 2011). The results indicated that emotional attachment explained 57.6% of the variation in satisfaction, and the complete model explained 43.6% of the variation in consumers' commitment toward the VAI. The total effect was measured using guidelines provided by Cohen (1988); all latent variables had a moderate to high significant effect, with values ranging from 0.2–0.7 ($p = 0.00$). Predictive relevance was also measured using a blindfolding procedure denoted as Q^2. The values of Q^2 for the endogenous variables were greater than 0, which further confirmed the model's predictive accuracy (Hair *et al.*, 2011, 2014) (Table 7). Additionally, the study measured the model's fit using the popular standardized root mean square residual (SRMR; Hu and Bentler, 1999), which is adaptive in PLS-SEM (Henseler *et al.*, 2016). SRMR value for our model was 0.060, which provided support for the model fit ((Henseler *et al.*, 2016).

7.4.3 Tests of hypotheses. The PLS-SEM results indicated that the proposed conceptual model (Figure 2) explained 60.7% of the variance in consumer–VAI emotional attachment ($R^2 = 0.607$), 57.6% of the variance in customer satisfaction ($R^2 = 0.576$), and 43.6% of the variance in repurchase intention ($R^2 = 0.436$). As hypothesized, anthropomorphism has a significant effect on emotional attachment ($b = 0.66$, $p = 0.00$, $t = 9.23$), and trust has a significant effect on emotional attachment ($b = 0.18$, $p = 0.02$, $t = 2.43$), thus confirming *H1* and *H2*, respectively (Table 8).

Consumer–VAI emotional attachment influenced the consumer–VAI self-connection in the predicted direction ($b = 0.75$, $t = 18.29$, $p = 0.00$), thus providing support for *H3*. The analysis also indicated that a consumer–VAI self-connection positively influenced customer satisfaction with grocery purchase using the VAI ($b = 0.76$, $t = 26.08$, $p = 0.00$) and satisfaction, as proposed earlier, positively influenced repurchase intention ($b = 0.66$, $t = 13.38$, $p = 0.00$), thus supporting *H4* and *H5*, respectively (Figure 2). Furthermore, the results also indicated a significant indirect effect of emotional attachment on satisfaction (emotional attachment → self-connection → satisfaction) as predicted and supported by the theoretical arguments presented earlier (indirect effect = 0.57, $t = 13.62$, $p = 0.02$). In addition, there was a significant indirect effect of self-connection on repurchase intention (self-connection → satisfaction → repurchase intention) (indirect effect = 0.51, $t = 10.19$, $p = 0.00$). This results thus answers *how* emotional attachment results in customer satisfaction, confirming that the self-connection consumers make with VAIs results in post-purchase satisfaction and hence results in intentions to repurchase (Table 8).

7.4.4 Multigroup analysis for the moderation effect of self-disclosure. Before conducting the multigroup analysis to examine the moderating effect of self-disclosure, the sample was subcategorized into two groups: low and high self-disclosure. A median split of the self-disclosure scores ($\alpha = 0.72$) was conducted (Iacobucci *et al.*, 2015) to create two subpopulations based on the number of self-disclosures, namely, low and high self-disclosure. Further configural invariance was established between the two groups (high and

Table 6.
Discriminant validity

	Anthropomorphism	Emotional attachment	Trust	Self-connection	Satisfaction	Intention to repurchase
Anthropomorphism	0.804					
Emotional attachment	0.777	0.813				
Trust	0.613	0.568	0.859			
Self-connection	0.726	0.754	0.688	0.864		
Satisfaction	0.627	0.631	0.755	0.759	0.801	
Intention to repurchase	0.501	0.488	0.448	0.625	0.66	0.943

low self-disclosure) and the standardized loadings for all indicators, with regression weights between 0.7 and 0.89 and $p > 0.05$. These results establish the invariance type and confirm equal composite scores across the two groups (Henseler *et al.*, 2014).

Like the complete model, the factor loading of the reflective constructs for the two groups (Group 1 = low self-disclosure and Group 2 = high self-disclosure) was ≥ 0.70. The validity of the constructs was assessed using composite reliability, convergent validity and discriminant validity. The composite reliability of the constructs was in the range of 0.87–0.95. Convergent validity was measured using the AVE, which was in the range of 0.6–0.88.

Constructs	R^2	Adjusted R^2	Q^{2**}	Effect
Anthropomorphism -> Emotional attachment				0.769*
Trust -> Emotional attachment				0.158*
Emotional attachment	0.766	0.764	0.456	
Self-connection	0.608	0.607	0.448	
Emotional attachment -> Self-connection				0.780*
Satisfaction	0.576	0.575	0.362	
Self-connection -> Satisfaction				0.759*
Intention to repurchase	0.436	0.434	0.385	
Satisfaction -> Intention to repurchase				0.660*

Notes: $^{*}p < 0.05$; $^{**}Q^2$ Calculated with d = 7

Table 7. Goodness-of-fit indices

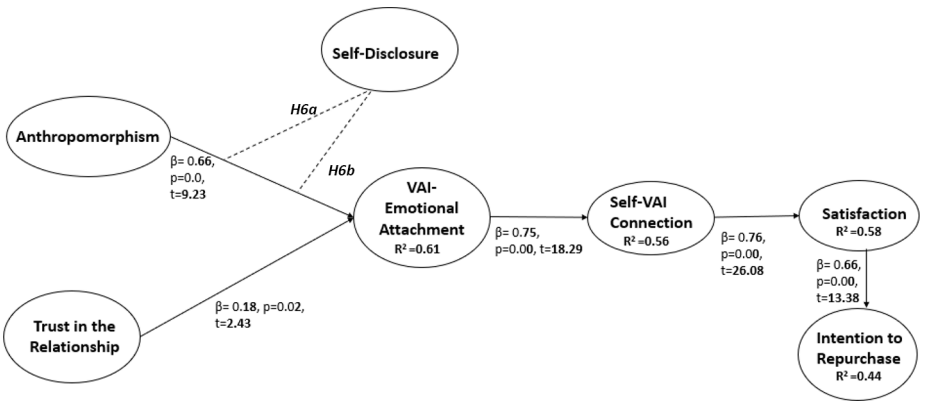

Figure 2. Effect of consumer–VAI emotional attachment on customer satisfaction and repurchase intention

Hypotheses	Path coefficient	Sample mean	SD	*t*-statistics	*p*-values
H1: Anthropomorphism -> Emotional attachment	0.658	0.659	0.071	9.232	0.00
H2: Trust -> Emotional attachment	0.176	0.174	0.072	2.437	0.015
H3: Emotional attachment -> Self-connection	0.747	0.745	0.041	18.238	0.00
H4: Self-connection -> Satisfaction	0.759	0.76	0.028	26.803	0.00
H5: Satisfaction -> Repurchase intention	0.660	0.662	0.049	13.384	0.00

Table 8. Hypotheses testing (path coefficients)

Examining the subgroups, the result indicated that the explained variance (R^2) was significantly different between the two groups. In the low self-disclosure group (Group 1), the model explained 54.1% of the variance in emotional attachment compared to the 73.7% of the variance in the consumer–VAI emotional attachment by the high self-disclosure group (Group 2).

The moderation approach for the multigroup analysis used a permutation-based nonparametric statistical test. It was conducted using SmartPLS, in which the data were repeatedly permuted at random to assess the hypotheses that compared the two groups (Chin and Dibbern, 2010). Through this permutation-based test, differences between the path coefficients of the groups were computed for each permutation to test for differences in the population. Thus, the PLS-MGA method (Henseler *et al.*, 2009) compares the bootstrap estimates of the two groups for the same parameter and is recommended by researchers for multiple-group analyses (Hair *et al.*,2018). The results established a moderating effect of self-disclosure; the strength of the relationship between anthropomorphism and emotional attachment and between trust and emotional attachment was higher in the high self-disclosure group, thus confirming *H6a* and *H6b*. Also, the path from trust–emotional attachment was not significant for the low-self-disclosure group. (Table 9).

7.5 Discussion

Study 2B served several purposes. First, the study re-examined *H1–H2* and *H6a* and *H6b*. Second, the multigroup analysis (MGA) (high vs low self-disclosure groups) indicated a significant difference in the variance in emotional attachment explained by the models and the path coefficients of the path from predictors (anthropomorphism and trust) to the emotional attachment. Third, the findings confirmed the effect of consumer–VAI self-connection on satisfaction with purchasing groceries using the VAI, resulting in an intention to repurchase. Therefore, the results provided support for the theoretical framework by showing that consumers form self-connections with VAIs because of the emotional attachments they form with VAIs. Thus, as argued earlier, the result confirmed the article's contention that consumers take an agentic role in their relationship with VAIs, transferring their identities into VAIs, resulting in increased post-purchase satisfaction and repurchase intention.

8. General discussion and implications

The study has introduced the concept of consumer–emotional attachment in the consumer–VAI relationship and anchored the conceptualization in the context of consumers' use of VAIs to purchase groceries. The conceptual framework proposed in the article to establish the role of anthropomorphism and trust in VAIs as predictors for consumer–VAI emotional attachment enabled the article to examine the agentic role of consumers who extend their self-identity in the relationship, creating a self-connection with VAIs. The article also introduced and empirically examined the popular concept of customer satisfaction and repurchase intention in the current context and argued that expressing self-identity in VAIs helps consumers take the agentic role during purchases, resulting in purchase satisfaction and intention repurchase.

The article's significant contribution is to provide knowledge about consumer–VAI emotional attachment and *when* the consumer–VAI attachment is stronger, and *how* this attachment results in grocery purchase satisfaction and intention to repurchase groceries using VAIs. To achieve this, the article has presented pretests and studies. Study 1 consisted of two pretests, and Study 2 was the main study. Pretests established and supported the article's contention that consumers view these VAIs as humanized relationship partners and

	Path coefficient (Low SD)	Path coefficient (High SD)	STDEV (Low SD)	STDEV (High SD)	t-statistics (Low SD)	t-statistics (High SD)
H6a: Anthropomorphism -> Emotional attachment	0.51	0.791	0.05	0.172	15.81*	2.96*
H6b: Trust -> Emotional attachment	0.306	0.13	0.168	0.059	1.82	2.19*

Notes: SD = self-disclosure; * $p < 0.05$

Table 9.
Multigroup analysis: moderating role of self-disclosure (H6a and H6b)

form emotional attachments. The pretests shed light on the tasks for which consumers communicated with VAIs and helped confirm that consumers indulged in higher self-disclosure for grocery purchase-related communication. The main studies, Study 2A and Study 2B, provided support for the theoretical framework, providing empirical support for the hypotheses on *when* consumers form emotional attachments with VAIs and how these attachments result in customer satisfaction and repurchase intention.

Research on consumers' emotional attachment to objects such as brands (Thomson *et al.*, 2005), places (Rubinstein and Parmlee, 1992), grocery retailers (Vlachos and Vrechopoulos, 2012), gifts (Mick and DeMoss, 1990) and other consumption objects (Thomson *et al.*, 2005) has established that consumers form feelings of "connection, love, affection and passion" toward these objects (Thomson *et al.*, 2005, p. 78). The possibility that consumers may develop similar feelings toward VAIs remains unexamined. Consumer–VAI emotional attachment is as interesting as these previously examined consumer–emotional attachment studies, suggesting that consumer–VAI emotional attachment can redefine the relationships between consumers, retailers and brands. For example, analogous to consumers' emotional attachment-driven brand commitment and repurchase intention, consumers who develop emotional attachments with their VAIs are likely to make self-connections with their VAIs. The results reflect what the study put forth in the literature review, i.e. when consumers engage in high self-disclosure, they form stronger emotional attachments with VAIs.

The article examined how this tie that consumers form with VAIs results in customer satisfaction and intention to repurchase, which have significant practical implications for retailers and managers. In explaining *how* the article examined the concept of consumer–VAI self-connection. A simple explanation of how self-connection results in purchase satisfaction and repurchase intention is consistent with Hoffman and Novak's (2018) contention that "extension is the agentic capacity of a part to enable the whole" (p. 1197). When consumers interact with VAIs for habitual tasks such as grocery shopping, which involves a back-and-forth interaction (as presented in the example at the beginning of the article), consumers shift over time to an agentic role in which they extend their self-identity into the VAIs. Thus, instead of performing the tasks themselves, such as ordering the groceries online, consumers transfer their capacities of ordering groceries online into the VAI, with which they have developed an emotional tie. This agentic extension of self-identity into the VAI then further results in satisfaction similar to the satisfaction consumers would have experienced when performing the task themselves.

8.1 Implications for research

Given the importance of consumer–brand relationships (Fournier, 1998; Thomson *et al.*, 2005; Alvarez and Fournier, 2016) and the growing prominence of how VAIs are transforming consumers' interactions and consumptions, the article makes several significant contributions. First, the present work advances the consumer–brand and consumer–object relationship literature, extending popular psychology and marketing theories such as attachment, self-disclosure, trust, self-connection, satisfaction and repurchase intention to the context of consumer–VAI relationships. The multifaceted nature of consumer–brand relationships has been a focus of the branding literature, and researchers have established that consumers form emotional attachments with brands or products (Ahuvia, 1993, 2005; Thomson *et al.*, 2005), form relationships with brands (Aggarwal, 2004), show brand love (Batra *et al.*, 2012) and anthropomorphize brands as human-like (Aggarwal and McGill, 2011). However, consumer behavior toward anthropomorphized smart devices and their relationships with these devices have not yet been explored in the same context. Theoretically, this study's findings suggest similarities

between human and consumer–brand relationships and identify unique aspects of these relationships that individuals form over a lifetime from their interactions with anthropomorphized VAIs.

The article's second contribution is that it establishes the moderating role of self-disclosure on the effect of emotional attachment on trust and satisfaction, thus introducing the concept of self-disclosure in the consumer–VAI relationship context. As VAIs are part of their home, individuals treat anthropomorphized VAIs as relationship partners or extended household members during their interactions with these devices. Because of their active interaction and responsiveness, VAIs play the role of partners in the relationship dyad. Applying the norms of an interpersonal relationship, consumers engage in self-disclosure during task completion, the task itself becoming the key determinant of the amount of self-disclosure. Thus, the present study empirically demonstrates that, depending on the kind of task in which consumers interact with VAIs, they engage in high or low self-disclosures. The results underscore the importance of understanding consumer–VAI relationships and how, depending on the task, the amount of self-disclosure plays a role in that relationship. With the division of the sample into two groups based on the amount of self-disclosure, the study establishes that for tasks that involve high self-disclosures, both emotional attachments to anthropomorphized VAIs and trust in those VAIs are greater is a stronger association between the two. These findings support earlier research that established a positive relationship between self-disclosure, liking and trust. When engaged in self-disclosure, consumers demonstrate stronger emotional attachments than when performing low-disclosure tasks. A theoretical implication is that self-disclosure, although identified as a building block for interpersonal relationships (Mikulincer and Nachshon, 1991), lacks the attention that other relationship variables have received. Thus, the current article opens the discussion about self-disclosure, provides a unique perspective on this popular psychological concept and brings it to task-related interactions with VAIs. Thus, the study makes a robust case for understanding the broader context of an individual's daily interactions with anthropomorphized VAIs as the basis for a stronger relationship. Accordingly, besides bringing the concepts of brand love, emotional attachment, trust, relationship satisfaction, commitment, and the importance of self-disclosure to this relationship realm, the present study also suggests an extension to these constructs.

Third, the conceptual framework extends self-connection, representing a novel way to integrate the concept of self-connection (Escalas and Bettman, 2013) and self-extension, and to show that these concepts can apply well in the current context. Unlike the assemblage theory view presented by Hoffman and Novak (2018), which stressed "how [the] identity of an assemblage and its components is territorialized and de-territorialized over time" (p. 1197), the current study examined consumers' self-identity and its extension into VAIs (or smart objects), resulting in the formation of consumer-VAI self-connection. Further, the article elaborated on Belk's (2013) concept of extension of self-identity, which asserted that technologies are changing consumer behavior, that this has "significant implication[s]" for the creation of self-extension, and that self-extension in the light of these new relationships is "more vital than ever" (p. 477).

In addition, the article brings a novel approach to satisfaction–repurchase intention research by establishing consumers' agentic role in grocery purchase satisfaction and intention to repurchase grocery using VAIs. The relationship between customer satisfaction and repurchase intention is well established in traditional settings (e.g. Anderson and Sullivan, 1993) and the online setting (e.g. Anderson and Sirinivasan, 2003); however, the use of VAIs in this context has not been examined. Thus, considering the increasing importance

of VAIs for both consumers and retailers, examining VAI's use for purchasing and repurchasing groceries is of great value.

8.2 Implications for practice

A report by Google stated that "41% of people who own a voice-activated device say it feels like talking to a friend or another person" (Kleinberg, 2018, p. 3). VAIs are becoming today's reality, and they are changing how consumers make decisions about consumption. Increasingly, consumers are communicating with anthropomorphized VAIs such as Alexa or Google Home for their everyday tasks and shopping. The current study takes the unique approach of bringing the discussion of anthropomorphism, consumer relationships, emotional attachment, trust and self-disclosure to VAIs. A critical insight that has emerged from this study involves the holistic aspect of the consumer–VAI relationship. Key findings of this study include that consumers perceive these devices as human-like and form emotional attachments with them, leading to increased purchase satisfaction and, hence, intention to repurchase, which are of high strategic importance to retailers. Retailers can work with VAI providers to enhance consumers' trust in VAIs and enhance the anthropomorphic qualities of VAIs, creating consumer–VAI emotional attachments, as indicated in the current article. Therefore, retailers can encourage the use of VAIs for grocery purchases, such as by offering coupons or by rewarding customers for using VAIs for grocery repurchases. From human–VAI interactions, "new opportunities will emerge that will have the potential to vastly expand the range of what consumers and objects can do and what can be done for them" (Hoffman and Novak, 2017, p. 1179).

9. Limitations and future research directions

The article is subject to a few limitations that future researchers can address. The article is built on the contention that consumers perceive VAIs as humanized and relationship partners; however, the study does not consider whether consumers will form emotional attachments if they do not perceive such devices as anthropomorphized. Future researchers can, thus, examine whether the hypothesized relationships exist if consumers do not perceive VAIs as human-like. The study also did not examine whether features of VAIs such as the effect of voice, type of interactions and response time impact anthropomorphism or the consumer–VAI emotional attachment. Future research can also examine the impact of these attributes of VAIs on the consumer–VAI relationship and use a longitudinal methodology to examine if this relationship changes over time. Future researchers could also examine whether the consumer's ethnicity has any confounding effect on this relationship, which the current article did not examine. As indicated earlier, the article presents an opening dialogue for future research on conversational commerce driven by VAIs; future researchers can expand the findings in different contexts other than grocery shopping and examine if shopping type has any effect on the consumer–VAI relationship. The article does not examine the effect of race, ethnicity, educational background, language spoken at home. Future researchers can also determine if these factors have any confounding effect on consumer relationships with VAIs. Future researchers, along with addressing the identified limitations, could also examine other concepts from the marketing and relationship literature, such as engagement and overall customer experience, or they could examine purchases other than groceries as avenues for future research.

The article took a relationship perspective when examining the effect of consumers' trust in the VAI; however, the article did not address consumers' concern with privacy and how that affect customers' trust in VAIs. Recent research has shown that privacy concerns negatively impact trust, negatively affecting consumer behavior (Zhou, 2011; Bansal, Zahedi

and Gefen, 2016). Future researchers can examine how consumers concerns with privacy and security can influence their relationship with the VAIs and hence their behavioral intentions. In addition to these limitations, future researchers could also examine if consumer cultures or countries have any confounding effect on their relationship with the VAIs. As the study was conducted using samples from the USA, samples from other countries outside the USA can extend this study and help us understand if consumer cultures or languages have any role to play in this relationship. As artificial intelligence is gaining importance because of advancements in technologies such as virtual reality, big data, machine learning, the future of marketing is predicted to change substantially (Huang and Rust, 2021). Future researchers can examine whether technology enhancement, such as creating a "digital avatar," would affect customers relationship with the VAI.

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Appendix 1

Use the scale below to record how willing you would be to reveal information about yourself to the VAD (the respondents were shown the name of the VAD they indicated they possess) for the tasks provided below. Select the number that best indicates the degree of self-disclosure at which you would be comfortable during that task related interaction with the VAD.

Table A1

	1	2	3	4	5	6	7
	I would be willing to share only a few details and on superficial level only						I would be willing to share in complete details about my needs and requirements in such a way that the VAD understands my thoughts and my requirements
Listening to music							
Checking the weather							
Calling the taxi							
Grocery-related tasks such as preparing the grocery list, adding items to the list or ordering grocery, etc.							
Controlling the lights							
Controlling the temperature							
Checking the news							
Checking the traffic							
Scheduling a meeting							

Appendix 2

To keep the shopping retailer the same, both scenarios, Amazon is the grocery provider (Alexa is owned by Amazon).

Anthropomorphism manipulation: Participants were shown an Alexa TV commercial showcasing grocery shopping using the voice-activated smart device, Alexa, indicating an anthropomorphic condition. Here is the description of the Alexa TV commercial:

In the commercial, a woman (presumable age around mid-40s) comes homes and tells her family that dinner will be ready in 15 min. As she walks toward the fridge, she sees that the dog food container is empty. She talks to Alexa and says, "Alexa, order some dog food." To this, Alexa (with a female voice) responds, "based on your order history; I can suggest some dog food. Would you like to add [it] to the shopping list?" The woman happily responds, yes. The woman then realizes that she is out of trash liners. She says, "Alexa, order some trash liners." Alexa then responds, "I found Glad trash liners that would cost 59 cents. Would you like to buy [them]?" The woman responds, yes. The woman is cleaning while she is interreacting with Alexa to order the groceries. Then, she realizes that she has to order gifts for the teachers. She asks Alexa, "Alexa, what is your deal?" Alexa responds by listing some offers in the grocery section that she can add, and the woman happily adds chocolate to her shopping list. The woman goes back to cooking the dinner, she sees a dirty shirt and she asks Alexa to order some laundry detergent for her as well.

No-anthropomorphism manipulation: The other video showed a traditional way of ordering grocery via personal computer and mobile phone via Amazon.com. In the video, a woman is shown to be grocery shopping via Amazon Fresh using her personal devices, such as personal computers and mobile. She goes browses the website, makes her grocery list and puts items in the grocery basket.

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